

IN THE CLAIMS

The following is a complete listing of the claims. This listing replaces all earlier versions and listings of the claims.

Claim 1 (currently amended): A method of modifying the geometric orientation of a digital image in an image acquisition apparatus adapted to acquire an image ~~in one amongst several~~ from at least one of a plurality of different orientations and to store [[said]] the image in [[the]] a form of a compressed file, ~~characterised in that it comprises the following said method comprising the steps of:~~

acquiring [[an]] the image in a chosen orientation;
identifying [[said]] the chosen orientation;
converting [[said]] the image into a digital image;
spectral transforming [[said]] the digital image;
determining a geometric transformation to be applied to [[said]] the image acquired as a function of the chosen orientation;
applying the determined geometric transformation determined to symbols associated with spectral coefficients issuing [[from]] in said spectral transforming step;
recording in the compressed file two indicators representing a normal or reversed order of the symbols respectively in two directions of the digital image;
and
coding the digital image in [[said]] the compressed file.

Claim 2 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that it includes a further comprising the step of quantizing the spectral coefficients before [[the]] said step of applying the geometric transformation, [[said]] the symbols being quantization symbols.

Claim 3 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that said wherein the spectral transforming performed in said spectral transforming step is a multiresolution decomposition, such as a wavelet spectral decomposition.

Claim 4 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that the wherein said step of identifying the chosen orientation is implemented by an automatic orientation detector incorporated in [[said]] the image acquisition apparatus.

Claim 5 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that the wherein said step of identifying the chosen orientation is implemented by a manual orientation selector incorporated in [[said]] the image acquisition apparatus.

Claim 6 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that wherein the image acquisition orientation is chosen from amongst a rotation through 90 degrees, a rotation through 180 degrees or a rotation through 270 degrees.

Claim 7 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that said wherein the spectral transformation transforming performed in said spectral transforming step is a multiresolution spectral decomposition, such as a wavelet spectral decomposition, and in that it also comprises includes a step of transposition of transpositioning a frequency sub-band having coefficients of low frequency in a first direction of the digital image and of high frequency in a second direction of the digital image with a frequency sub-band of the same resolution level in the spectral decomposition, having coefficients of high frequency in [[said]] the first direction and of low frequency in [[said]] the second direction when the geometric transformation comprises a rotation through 90 degrees or 270 degrees.

Claim 8 (currently amended): [[The]] A geometric orientation modification method according to Claim 1, characterised in that it also comprises further comprising a step of transposition of transpositioning the values of the height and width of the image when the geometric transformation applied comprises a rotation through 90 degrees or 270 degrees.

Claim 9 (currently amended): A device for modifying the geometric orientation of a digital image incorporated in an image acquisition apparatus adapted to acquire an image in accordance with one amongst several at least one of a plurality of different orientations and to store [[said]] the image in the form of a compressed file, [[having]] said device comprising:

means for acquiring [[an]] the image in a chosen orientation;
means for identifying [[said]] the chosen orientation;

means for converting [[said]] the image into a digital image;

means for spectral transformation of said transforming the digital image;

means for determining a geometric transformation to be applied to [[said]] the image acquired as a function of the chosen orientation;

means for applying the determined geometric transformation determined to symbols associated with spectral coefficients issuing from [[said]] the spectral transformation performed by said spectral transforming means;

means for recording in the compressed file two indicators representing a normal or reversed order of the symbol respectively in two directions of the digital image; and

means for coding the digital image in [[said]] the compressed file.

Claim 10 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, ~~characterised in that it has~~ further comprising means for quantizing the spectral coefficients adapted to quantize [[said]] the spectral coefficients before application of the geometric transformation, [[said]] the symbols being quantization symbols.

Claim 11 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, ~~characterised in that said~~ wherein the spectral transformation performed by said spectral transforming means is a multiresolution spectral decomposition, such as a wavelet spectral decomposition.

Claim 12 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, ~~characterised in that the~~ wherein said means for identifying the chosen orientation ~~comprise~~ includes an automatic orientation detector incorporated in said image acquisition apparatus.

Claim 13 (currently amended): Geometric A geometric orientation modification device according to Claim 9, ~~characterised in that the~~ wherein said means for identifying the chosen orientation ~~comprise~~ includes a manual orientation selector incorporated in said image acquisition apparatus.

Claim 14 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, ~~characterised in that~~ wherein the image acquisition orientation is chosen from amongst a rotation through 90 degrees, a rotation through 180 degrees or a rotation through 270 degrees.

Claim 15 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, ~~characterised in that said~~ wherein the spectral transformation performed by said spectral transforming means is a multiresolution spectral decomposition, such as a wavelet spectral decomposition, and in that it also comprises means for transposition transpositioning a frequency sub-band having coefficients of low frequency in a first direction of the digital image and of high frequency in a second direction of the digital image with a frequency sub-band of the same resolution level in the spectral decomposition, having coefficients of high frequency in [[said]] the first direction

and of low frequency in [[said]] the second direction when the geometric transformation comprises a rotation through 90 degrees or 270 degrees.

Claim 16 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, characterised in that it also has further comprising means for transposing the values of the height and width of the image when the geometric transformation applied comprises a rotation through 90 degrees or 270 degrees.

Claim 17 (currently amended): [[The]] A geometric orientation modification device according to Claim 9, characterised in that the wherein said means for [[the]] spectral transformation of said transforming the digital image, [[the]] said means for determining a geometric transformation, [[the]] said means for applying the geometric transformation, [[the]] said means for entering indicators in the compressed file, [[the]] said coding means, and if applicable [[the]] said quantization and transposition means, are incorporated in:

a microprocessor,
a read only memory containing a program for modifying the geometric orientation of [[a]] the digital image, and
a random access memory containing registers adapted to record variables modified during the running of [[said]] the program.

Claim 18 (currently amended): An image processing method, implemented in an image acquisition apparatus, comprising the steps of[[;]]:
generating image data representing an image;

wavelet-transforming the image data;
quantizing the transformed data; [[and]]
entropically encoding the quantized data; characterized in that said
method further comprises the steps of:

identifying a correct orientation of the image represented by the
image data, from among four possible orientations, as a function of the position of the
image acquisition apparatus; and

applying a geometric transformation to the transformed data in
accordance with the result of the identification.

Claim 19 (currently amended): A method according to Claim 18,
characterized in that wherein the image data are transformed into sub-bands corresponding
to each of a plurality of resolution levels in said wavelet-transforming step.

Claim 20 (canceled)

Claim 21 (currently amended): A method according to Claim 18,
characterized in that wherein said method further comprises the step of storing the
information showing the result of the identification, and the encoded data.

Claim 22 (currently amended): An image processing apparatus, comprising:
means for generating [[an]] image data representing an image;
means for wavelet-transforming the image data;
means for quantizing the transformed data; [[and]]

means for entropically encoding the quantized data, ~~characterized in that said apparatus further comprises:~~

means for identifying a correct orientation of the image represented by the image data from among four possible orientations, as a function of the position of said image processing apparatus; and

means for applying a geometric transformation to [[said]] the transformed data in accordance with the result of the identification.

Claim 23 (currently amended): An apparatus according to Claim 22, ~~characterized in that wherein~~ said wavelet-transforming means transforms the image data into sub-bands corresponding to each of a plurality of resolution levels.

Claim 24 (canceled)

Claim 25 (currently amended): An apparatus according to Claim 22, ~~characterized in that wherein~~ said apparatus further comprises [[the]] means [[of]] for storing the information showing the result of the identification, and the encoded data.

Claim 26 (currently amended): An image acquisition apparatus, ~~characterised in that it wherein~~ said apparatus has a geometric orientation modification device according to Claim 9.

Claim 27 (currently amended): A digital photographic apparatus, characterised in that it wherein said apparatus has a geometric orientation modification device according to Claim 9.

Claim 28 (currently amended): A digital camera adapted to function in a still image mode, characterised in that it wherein said camera has a geometric orientation modification device according to Claim 9.

Claim 29 (currently amended): A storage means, readable by a microprocessor, characterized in that it wherein said storage means is adapted to implement the geometric orientation modification method according to Claim 1.

Claim 30 (currently amended): A storage means, readable by a microprocessor, characterized in that it wherein said storage means is adapted to implement the image processing method according to Claim 18.

Claim 31 (currently amended): A computer program product, loadable into a programmable processing apparatus, characterized in that it wherein said computer program product comprises software code portions adapted to implement execute the geometric orientation modification method according to Claim 1.

Claim 32 (currently amended): A computer program product, loadable into a programmable processing apparatus, characterized in that it wherein said computer

program product comprises software code portions adapted to implement execute the image processing method according to Claim 18.